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THE STATUS OF SCIENCE IN THE PUBLIC SCHOOLS OF IOWA. PART I, ELEMENTARY SCHOOL.

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REPORT NUMBER 12640-1110IRP PUB DATE 64
IOWA STATE DEPT. PUBLIC INSTR., DES MOINES
EDRS PRICE MF-$0.09 HC-$1.48 37P.

DESCRIPTORS- *COURSE CONTENT, *CURRICULUM DEVELOPMENT, *ELEMENTARY SCHOOL SCIENCE, *EVALUATION, INSERVICE TEACHER EDUCATION, TEACHER QUALIFICATIONS, TEACHING PROCEDURES, IOWA CITY, DES MOINES

INFORMATION WAS COLLECTED BY QUESTIONNAIRE FROM SUPERVISORS AND SCIENCE TEACHERS IN 51 SCHOOLS THROUGHOUT IOWA TO DETERMINE THE STATUS OF SCIENCE PROGRAMS IN IOWA ELEMENTARY SCHOOLS. EQUAL NUMBERS OF SMALL-, MEDIUM-, AND LARGE-SIZED SCHOOLS WERE SELECTED. DATA COLLECTED AND ANALYZED INCLUDED (1) THE AVAILABILITY OF EQUIPMENT, SUPPLIES, BOOKS, AND VISUAL AIDS, (2) CURRICULUM DEVELOPMENT ACTIVITIES, (3) PRESENCE OF SCIENCE SUPERVISORS AND INSERVICE TRAINING PROGRAMS, (4) CLASSROOM TEACHING PRACTICES IN USE, (5) TEACHER QUALIFICATIONS, AND (6) COURSE CONTENT. SIMILAR REPORTS HAVE BEEN RELEASED ON THE STATUS OF SCIENCE IN THE JUNIOR HIGH SCHOOLS AND SENIOR HIGH SCHOOLS OF IOWA. (RS)

The Status of Science in the Public Schools of Iowa

Part I—ELEMENTARY SCHOOL

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1964

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STATUS OF SCIENCE IN THE ELEMENTARY SCHOOLS OF IOWA

Introduction

This report is based on a study undertaken in May, 1963. The principal purposes of the study are:

1) Ascertaining the status of present science curricula in the elementary schools of Iowa.

2) Cataloguing this information.

A comparison of this information will be made with similar data collected late in 1965. The purpose of this comparison will be to measure the impact of the new state science curriculum, Science for Iowa Schools, on the science programs, kindergarten through six, in the public schools of Iowa. In addition to this report, similar ones will follow which will describe the current status of science as it existed in May, 1963, in the junior and senior high schools of this state.

The information summarized in this paper was collected from fifty-one school systems.(1) All of these schools were chosen at random by the Iowa Department of Public Instruction on the basis of geographical location and enrollment of High School District. Thus, the schools chosen were as representative as possible of all Iowa schools.

A group of seventeen of these schools had High School District enrollments of 600 or more students. This group of schools is designated as "Group I", or "larger", schools. The second group of seventeen had a High School District enrollment of 300-599 students and is designated as "Group II", or "medium-sized", schools. The third group of seventeen schools had a High School District enrollment of 0-299 students and is designated as "Group III", or "small", schools. The information contained herein was gathered by a science teacher or administrator from each of the seventeen medium-sized High School Districts (300-599 students).(2) These people administered the questionnaires to their own schools first and then each to a smaller and larger school.

One supervisor for each of the fifty-one elementary schools filled out a questionnaire. Also, seven teachers in each school (one teacher for each of the seven grades, K - 6, or a total of 357 teachers) filled out similar questionnaires. The supervisors and/or teachers in addition completed a third form (basically a checklist) which furnished information concerning curriculum offerings by topic and emphasis.

All of the above-mentioned information was then compiled by I.B.M. computers into a more condensed form from which tables and graphs were prepared. The following summarizes as objectively as possible the information disclosed by these tables and graphs.(3)

SECTION I: SUPERVISORS' EVALUATION

RESUME OF ELEMENTARY SCHOOL SUPERVISORS' REPORTS

A. Curriculum in General

Of the fifty-one schools participating in this study more than half (29 schools)

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(1) See Appendix A for list of participating schools and their geographical distribution.
(2) See Appendix B for list of school personnel.
(3) See Appendix C for these tables.

stated they had a planned science curriculum. Twenty-eight of these 29 schools had prepared their curricula within a five-year period, 1958-1963.(1) The peak year for curriculum development was in 1961 when eight of the 28 schools (i.e. 28.9%) developed their curricula. The highest number of curricula developed by schools prior to 1961 was three each in the years 1958 and 1959. The majority of the planned curricula, or 17, was jointly planned by teachers and administrators while the remaining ten were developed by teachers alone.(2) For those schools reporting no planned curriculum (i.e. 20 schools), two-thirds (or 13 schools) indicated they were preparing to develop one. The remaining seven of the 20 schools reported no plans for science curriculum development.

Four-fifths (79.9%) of the administrators and 51% of the teachers indicated they knew that a new state curriculum in science was being developed. Eight out of every ten schools(3) planned to use the new state science curriculum when available. The majority of these schools who plan to use this curriculum indicated they would use it as a pattern to develop their own local science programs.

B. Other Characteristics(4)

1. The following would characterize the status of elementary school science as of May, 1963:

   a. A decided majority of the schools was not departmentalized for science. (87.8%)

   b. Lack of departmentalization in other curriculum areas was reported by these schools.

   c. All departmentalization reported was for grades four through six.

   d. Few schools (21.9%) had special science rooms.

   e. Approximately three-fourths of both the supervisors and teachers rated availability of equipment and supplies good to excellent. However, fewer teachers than supervisors gave ratings of very good and excellent; the variation was greater for supplies.

   f. The majority of the schools did not have a special mathematics or science consultant.

   g. Most schools had conducted neither science workshops nor in-service science programs. Of those conducted, practically all were reported by Group I Schools (larger High School District) for the school year 1962-63. (The year of this study)

   h. Science fairs were not common at the elementary school level but were on the increase.

   i. The time alloted to science ranged from 115 minutes to 150 minutes per week.

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(1) These data were collected in May, 1963.
(2) Two schools failed to report on this phase of curriculum development.
(3) Hereafter, any statement referring to "schools" implies schools as reported by supervisors
(4) More detailed information concerning characteristics is found in Appendix C.

2. Books (texts, special reference) and Periodicals (Adequate? Up-to-date?)

   a. Most of the schools (81%) used the single text approach.

   b. Most schools rated their texts only as "good" as indicated by a rating of three on a one to five point scale.

   c. Most of the supervisors rated the books as average.

   d. Half of the schools rated their periodicals as average.

3. Classroom Methods

   a. Text reading followed by discussion was the most frequently reported method of teaching science in all schools regardless of size.

   b. Teacher demonstrations, pupil experiments, and pupil demonstrations (in this order) were the next most frequent methods of instruction.

   c. Less frequently used were directed observations, research reading, field trips and excursions, and other methods.

4. Visual Aids

   a. The bulletin board was the most frequently used visual aid in all schools.

   b. Filmstrips, films, and charts (in this order) were the next most frequently used visual aids.

   c. Live materials, models, and dioramas were least frequently used.

SECTION II: TEACHERS' EVALUATION

RESUME OF ELEMENTARY SCHOOL TEACHERS' REPORTS

A. Curriculum in General

Nearly two-thirds of the teachers (61.9%) reported their schools had a planned curriculum. Most of these were developed primarily by a teacher-administrator committee during the years 1961 and 1962. This result was similar to that reported by the supervisors. Almost two-thirds of the schools reporting no planned curriculum indicated they were planning to develop one.

Slightly more than half (55.3%)(1) of the teachers interviewed knew about the new state science curriculum and of these nearly three-fourths planned to use it.(2)

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(1) The Supervisors reported 51% of the teachers knew about the new state science curriculum. See page 2.

(2) See Appendix D for these tables.

Nearly all of these teachers were planning to use it as a pattern for curriculum evaluation and revision rather than using it en toto.

B. Other Characteristics

1. Teachers made the following characterizations:

   a. Approximately three-fourths (71.4%) of the reporting schools were not departmentalized. (This compared to 87.8% reported by the supervisors.)

   b. The number of schools not departmentalized in other areas was about the same (77.4%) as those not departmentalized in science (71.4%).

   c. Very few schools had special science rooms (9.9%). (In contrast, 21.9% of the supervisors reported such special rooms.)

   d. Approximately 10% of the teachers rated their equipment as excellent and slightly less than 25% rated it as very good.(1)

   e. Nearly 9% of the teachers rated supplies as excellent and approximately 20% rated them as very good.(1)

   f. The majority of schools had neither a science nor mathematics consultant.

   g. Slightly less than half (43.2%) of the schools had conducted science workshops. Most were conducted in 1962.

   h. Sixteen per cent of the schools conducted in-service science courses; most were held in 1962.

   i. Less than half of the schools held science fairs; more were held in 1963 than any other year.

   j. The time spent in teaching science ranged from 107 to 125 minutes per week.

2. Books (texts and special references) and Periodicals (Adequate? Up-to-date?)

   a. The majority of the schools (91%) used the single text approach. This compared with 84% reported by the supervisors.

   b. Most of the teachers rated their books as average.

3. Classroom Methods

   a. Text reading followed by discussion was the most frequently reported method of teaching science in schools of all three sizes.

   b. Teacher demonstrations, pupil experiments, and pupil demonstrations (in this order) were the next most frequent methods of instruction.

   c. Directed observations, research reading, field trips and excursions, and other methods were less frequently used.

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(1) Fewer teachers than supervisors made this rating. See point "e", "Other Characteristics, page 2.

d. There was general agreement between the supervisors and teachers on these points.

4. Visual Aids

a. The bulletin board was most frequently used in all three sized schools.

b. The use of live materials was ranked second. (This was ranked fifth by the supervisors.)

c. Next were charts and films which were given equal rank.

d. Filmstrips, models, and dioramas were ranked next (in this order). (The supervisors rated filmstrips second.)

Teacher Background

1. Education:

a. One hundred fifty-seven of 357 teachers reported they held baccalaureate degrees. The majority of these was in large (Group I) schools.

b. Eleven of the 357 teachers held masters degrees. Again the majority of these was found in the large schools.

c. The greatest number of teachers had course work in the biological sciences. Earth science was the second most popular area.

d. The teachers had taken a great variety of course work in the other science areas. See Table C in the Appendixes.

2. Experience:

a. The teachers in the medium-sized (Group II) schools had an average of 13.8 years of science teaching experience.

b. The teachers in the large and small (Group III) sized schools had 11.0 and 11.4 years of science teaching experience, respectively.

c. The teachers in the medium and small schools had slightly more general teaching experience, averaging 14.4 and 14.3 years respectively, than the teachers in the large schools with an average of 13.6 years of experience.

SECTION III: COURSE CONTENT

Certain subject matter areas, such as weather and the solar system, are included as a part of the traditional science topics wherever elementary school science is taught in the United States. Information was collected to see whether the Iowa schools were traditional in their science pattern. Such information will be important when a determination of the impact of the new Science For Iowa Schools is made in 1965. The following is a brief summary of the science topics which were being taught in Iowa Public Schools. The topics are listed in order of their frequency as of May, 1963.

1. The general content area most frequently taught was health which was equally emphasized at every grade level, kindergarten through grade six.

2. Seasons and seasonal changes, including adaptation of plants and animals to these changes, were the next most frequently taught. There was slightly more emphasis on these topics in the lower grades than the upper grades.

3. Living things, from an ecological approach, was the next most commonly taught area.

4. Slightly less emphasized was the sun and its influence on the earth as well as its relationship to the rest of the Solar System.

5. Meteorological topics, such as effect of hearing air, forms of precipitation, and clouds, were emphasized at all grade levels.

6. The major emphasis of the remaining topics was in the physical sciences in the following order:

   a. Magnetism, sound

   b. Machines

   c. Light

   d. Electricity

   e. Aeronautics and space exploration

   f. Matter and energy (general concepts)

   g. Atomic energy

7. Slightly less frequently taught were the human organ systems and earth science.

The frequency and order of topics listed above followed the traditional pattern. Those topics listed under points six and seven above, with very few exceptions, were taught almost exclusively in the upper elementary grades (grade 4 through 6). Some of these topics were probably restricted to the upper grades because of the content background needed before they could be taught effectively. Others of these might be taught, in part, at a lower grade level if the teacher were to adapt the content to the grade.

In analyzing the impact of Science For Iowa Schools a comparison will be made of these data collected May, 1963, with the information obtained in 1965 to determine changes which have occurred in grade placement of various topics and order of their frequency taught. There are many other aspects of such a comparative study which will be included in a later report.

APPENDIXES

A. SCHOOLS SELECTED FOR SCIENCE SURVEY AND MAP SHOWING GEOGRAPHIC DISTRIBUTION

B. SCHOOL PERSONNEL COLLECTING DATA FOR THIS STUDY

C. DATA COLLECTED FROM SUPERVISORS

D. DATA COLLECTED FROM TEACHERS

SCHOOLS SELECTED FOR SCIENCE SURVEY

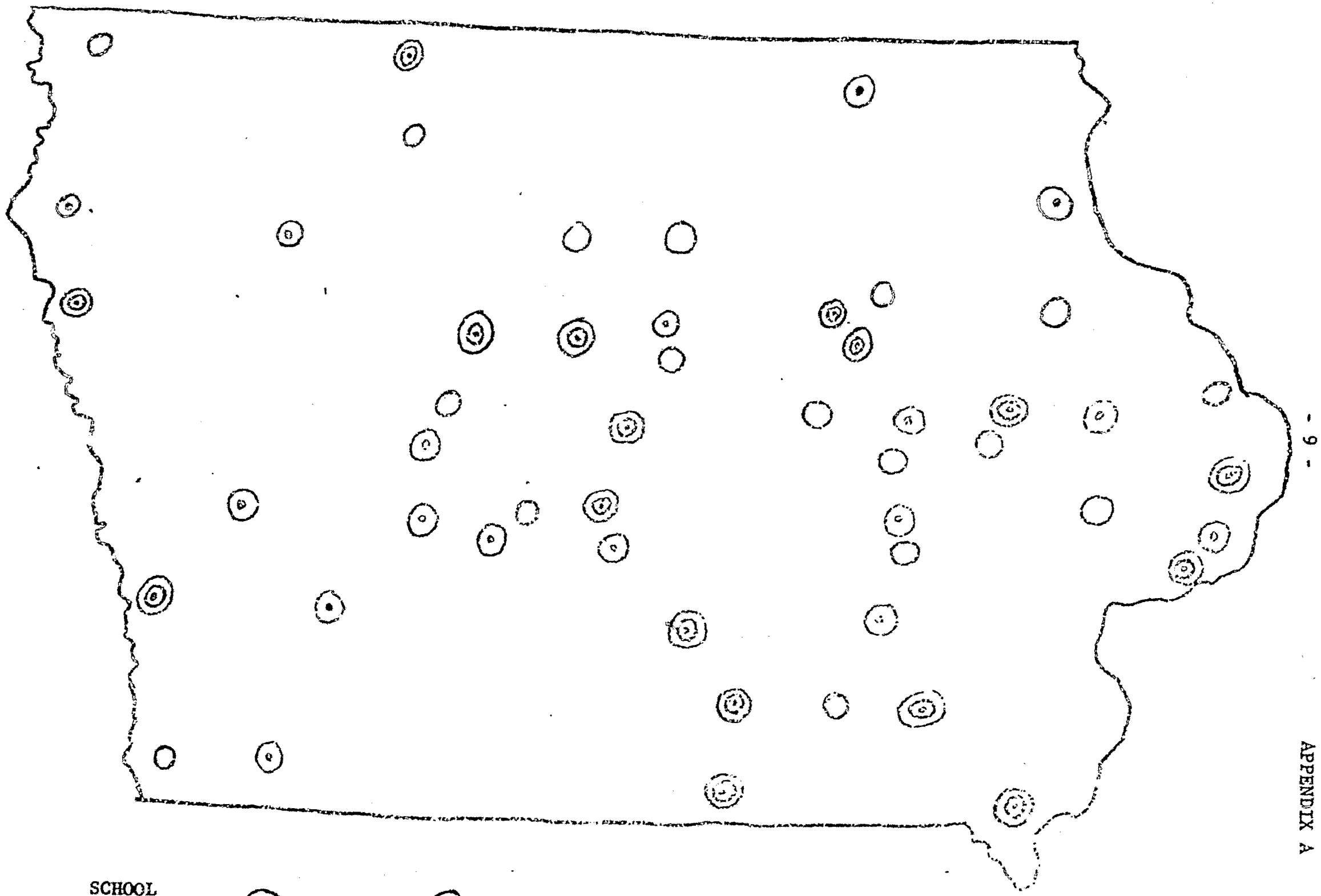
	Name of District	County	High School Enrollment
Group I	Des Moines	Polk	10,775
	Cedar Rapids	Linn	4,868
	Davenport	Scott	4,665
	Waterloo	Black Hawk	4,202
	Sioux City	Woodbury	3,894
	Council Bluffs	Pottawattamie	3,537
	Fort Dodge	Webster	1,818
	Clinton	Clinton	1,728
	Ames	Story	1,321
	Cedar Falls	Black Hawk	1,185
	Keokuk	Lee	1,031
	Fairfield	Jefferson	887
	Webster City	Hamilton	822
	Centerville	Appanoose	687
	Estherville	Emmet	654
	Albia	Monroe	653
	Knoxville	Marion	645
Group II	Le Mars	Plymouth	571
	North Scott	Scott	557
	Iowa Falls	Hardin	533
	Perry	Dallas	519
	Storm Lake	Buena Vista	499
	Jefferson	Greene	474
	Clarinda	Page	445
	Vinton	Benton	426
	Monticello	Jones	403
	Harlan	Shelby	390
	Johnston Cons	Polk	368
	Griswold	Cass	347
	Williamsburg	Iowa	333
	Central Comm.	Clayton	335
	Sigourney	Keokuk	322
	Guthrie Center	Guthrie	313
	Riceville	Howard	307
Group III	West Lyon	Lyon	265
	Traer-Clutier	Tama	250
	Edgewood-Colesburg	Delaware	237
	H L V	Iowa	223
	Eddyville	Wapello	210
	CAL	Franklin	195
	Dunkerton	Black Hawk	186
	Lincoln Comm.	Cedar	177
	Farragut	Fremont	170
	Churdan	Greene	161
	Alden	Hardin	152
	Norway	Benton	142
	Lisbon	Linn	134
	Woodward	Dallas	124
	Ruthven	Palo Alto	118
	Miles	Jackson	107
	Goldfield	Wright	101

600 +

300-599

0-299

Schools Selected for Science Survey
To Show Geographical Distribution



SCHOOL PERSONNEL COLLECTING DATA FOR THIS STUDY

1. Richard Peterson - Le Mars - Physics Instructor
2. Melvin E. Heiler - North Scott - Junior and Senior High Principal
3. Kenneth Harfst - Iowa Falls - Science Instructor
4. Thomas Drake - Perry - Junior High Principal
5. Richard Kearney - Storm Lake - Chemistry Instructor
6. Anthony A. Andrusyk - Jefferson - Biology Instructor
7. Jerald Blasi - Clarinda - Senior High Principal
8. Donald DePrenger - Vinton - Chemistry Instructor
9. Dale Greenawald - Monticello - Junior and Senior High Principal
10. Glen Kuiper - Harlan - Chemistry and General Science Instructor
11. Richard Seveeney - Johnston - Chemistry and Biology Instructor
12. V. A. Chadwick - Griswold - Senior High Principal
13. Roland Chapman - Williamsburg - Biology Instructor
14. Harold Ebel - Central - Senior High Principal
15. Harrison Seip - Sigourney - Head, Science Department
16. Ted K. Hansen - Guthrie Center - Elementary Principal
17. Dale C. Guldberg - Riceville - Senior High Principal

APPENDIX C

DATA COLLECTED FROM SUPERVISORS

Schools by size	Planned Curriculum	No Planned Curriculum	Date Curriculum Planned							Teacher Prepared Curriculum	Teacher and Administrator Prepared Curriculum	Plans for Curriculum Development	
			before 58	58	59	60	61	62	63			Yes	No
Large	13	4	1	1	2	1	4	2	2	3	9	3	1
Medium	7	9	0	2	1	0	3	0	1	1	6	9	0
Small	9	7	0	0	0	1	1	4	2	6	2	1	6
TOTALS	29	20	1	3	3	2	8	6	5	10	17	13	7
%	59	41	3.0	7	10.3	7.0	28.	21.4	18.	37	63	65	35

Table C-1. [illegible] of grade 1 curriculum

Schools by Size	Adminstrator know about State Curriculum		Teachers know about State Curriculum		Plan to use State Curriculum?		Adopt as is	Serve as Pattern
	Yes	No	Yes	No	Yes	No		
Large	12	5	6	11	11	2	1	11
Medium	15	1	12	4	14	1	2	13
Small	12	4	7	9	11	5	0	11
Totals	39	10	25	24	36	8	3	35
%	79.9	20.1	51.0	49.0	81.8	18.2	7.9	92.1

Table C-2. Supervisors' statements concerning state curriculum

Schools by Size	Departmentalization in Science				Departmentalization in other areas		Special Rooms	
	Yes	No	K - 3	4 - 6	Yes	No	Yes	No
Large	6	11	0	6	6	8	5	12
Medium	0	16	0	0	2	14	1	15
Small	0	16	0	0	4	10	3	12
Totals	6	43	0	6	12	32	9	39
%	12.2	87.8	0.0	100.0	27.3	72.7	21.9	78.1

Table C-3. Status of departmentalization.

Schools by Size	Single Text		Multiple Text		Adequacy & up-to-dateness of texts					Adequacy & up-to-dateness of Reference Materials									
										Books					Periodicals				
	Yes	No	Yes	No	Excel	Very Good	Good	Poor	Very Poor	Excel	Very Good	Good	Poor	Very Poor	Excel	Very Good	Good	Poor	Very Poor
Large	10	4	9	6	4	7	4	2	0	4	6	6	1	0	1	1	11	3	1
Medium	13	1	3	6	2	5	5	3	0	4	6	5	0	0	0	3	6	2	2
Small	14	2	2	7	4	2	8	1	1	3	5	6	2	0	1	1	6	7	1
Totals	37	7	14	19	10	14	17	6	1	11	17	17	3	0	2	5	23	12	4
%	84.0	16.0	42.0	58.0	20.8	29.2	35.4	12.5	2.1	22.9	35.4	35.4	6.4	0.0	4.4	10.9	50.0	26.1	8.3

Table C-4. Status of texts and other reference materials.

Schools by Size	Availability of Equipment					Availability of Supplies				
	Excellent	Very Good	Good	Poor	Very Poor	Excellent	Very Good	Good	Poor	Very Poor
Large	4	6	5	1	1	5	7	3	1	1
Medium	2	5	4	4	0	3	6	4	2	0
Small	2	2	7	5	0	2	3	8	3	0
Totals	8	13	16	10	1	10	16	15	6	1
%	17	27	33	21	2	21	33	32	12	2

Table C-5. Status of equipment and supplies.

Schools by Size	Special Consultants						Schools Have Conducted:														
	Science		Math		Combined		Science Workshops					In-service Science Courses					Science Fairs				
	Yes	No	Yes	No	Yes	No	59	60	61	62	63	59	60	61	62	63	59	60	61	62	63
Large	3	11	3	11	4	11	3	0	0	5	3	1	0	1	2	2	1	0	1	1	4
Medium	0	15	0	15	0	14	1	1	0	2	0	0	0	0	3	2	0	0	0	2	6
Small	2	14	1	15	0	14	0	0	0	1	0	0	0	0	0	1	0	0	1	1	2
Totals	5	40	4	41	4	39	4	1	0	8	3	1	0	1	5	5	1	0	2	4	12

Table C-6. Status of programs for the improvement of science.

Large Schools		Medium Schools		Small Schools	
School	Mins/Week Taught	School	Mins/Week Taught	School	Mins/Week Taught
A	85	A	70	A	
B	90	B	90	B	
C	110	C	90	C	
D	120	D	90	D	75
E	135	E	95	E	80
F	141	F	110	F	87
G	150	G	120	G	100
H	150	H	120	H	100
I	150	I	120	I	130
J	150	J	125	J	150
K	160	K	135	K	150
L	175	L	200	L	162
M	225	M	200		
N	238	N	225		
O	250				
Average	155	Average	128	Average	115

Table C-7. Minutes per week allotted for science.

Classroom Method	Large Schools									Medium Schools									Small Schools									Ranking			
Ranking	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	Large	Medium	Small	Totals
Text Reading and Discussion	11	2	1					1		15		1							15		1							1	1	1	1
Teacher Demonstrations	1	5	3	1	2	1	1				11	1	2	1	1					13	1	2						2	2	2	2
Pupil Demonstrations		4	5	4		2						7	4	5					1	1	5	5	3	1				4	4	3	4
Pupil Experiments	1	2	3	5	2	1					2	5	5	3	1					2	2	6	5		1			3	3	4	3
Field Trips and Excursions					2	2	3	6	2		1	.	2	2	2	3	4	1			1	1	2	4	4	4		7	6	7	7
Outdoor Education							8	4	3			1			3	3	5	3						6	4	3	3	8	8	8	8
Directed Observations	2	1		3	4	3	1	1		1	1		3	3	3	2	2				2		2	4	2	5		5	5	6	5
Research Reading		1	3	1	3	4	1	1	1			1		2	4	4	4	1			3	2	4	1	2	1	2	6	7	5	6
Resource People					2	2	1	1	8					1	3			11							2	2	10				

Table C-8. Numbers of schools ranking classroom methods used. Where numbers do not occur i.e., empty boxes, indicates that no schools gave these rankings to these particular methods.

Visual Aids	Ranking	Large Schools							Medium Schools							Small Schools							Ranking		
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	Least	Medium	Most
Films		4	2	6	1	2			4	1	2	4		3	2	2	2	2	1	1	3	2	2	2	3
Filmstrips		3	5	1	3	1	1	1	5	5	2	1	1	1	1	2	3	5	4	1	1		3	3	1
Bulletin Boards		7	3	4	1				5	4	6	1				7	4	3	1				1	1	2
Live Materials			1	2	5		6	1		5	2	3	3	1		1	1	5	4				5	5	4
Diorama							3	12	1				2	4	8								7	7	7
Charts		1	3	2	5	4			2	1		2	4	3	1	4	3	6	3				4	5	3
Models			1			8	5	1		2		2	3	5	3	2							6	6	6

Table C-9. Numbers of schools ranking visual aids used. Where numbers do not occur i.e., empty boxes, indicates no schools gave these rankings to these particular visual aids.

APPENDIX D

DATA COLLECTED FROM TEACHERS

Schools by Size	Planned Curriculum		Date Curriculum Planned							Curriculum Prepared		Plans for Curriculum Development	
	Yes	No	Before 58	58	59	60	61	62	63	by teachers	by teachers and administrator	Yes	No
Large	82	25	8	9	11	8	20	12	1	29	50	9	6
Medium	57	55	4	7	2	7	14	11	3	18	35	38	12
Small	63	44				10	23	22	4	30	23	12	19
Totals	202	124	12	16	13	25	57	45	8	77	108	59	37
%	61.9	38.1	6.9	9.1	7.3	14.2	32.4	25.6	4.5	41.6	58.4	61.5	38.5

Table D-1. Teachers' evaluation of school curriculum

APPENDIX D

Schools by Size	Teachers know about State Curriculum		Plan to use State Curriculum		Adopt as is	Serve as pattern
	Yes	No	Yes	No		
Large	62	37	58	16	4	49
Medium	62	50	66	24	5	50
Small	47	53	53	22	6	40
Totals	171	140	177	62	15	139
%	55.3	44.7	74.0	26.0	9.9	90.1

Table D-2. Teachers' statements concerning state curriculum

Schools by Size	Departmentalization in science		Departmentalization in other areas		Special rooms	
	Yes	No	Yes	No	Yes	No
Large	32	66	22	47	13	93
Medium	5	109	25	60	1	113
Small	3	105	3	64	18	85
Totals	40	280	50	171	32	291
%	12.5	87.5	22.6	77.4	9.9	90.1

Table D-3. Status of departmentalization

Schools by Size	Single text approach		Adequacy & up-to-dateness of texts					Adequacy & up-to-dateness of reference books				
	Yes	No	Excel	Very Good	Good	Poor	Very Poor	Excel	Very Good	Good	Poor	Very Poor
Large	51	9	21	40	27	12	2	19	36	46	2	1
Medium	66	5	9	23	50	19	4	14	26	43	21	2
Small	70	3	9	32	44	17	1	10	26	42	23	1
Totals	187	17	39	95	121	48	7	43	88	131	46	4
%	91.0	9.0	12.6	30.7	39.0	15.4	2.3	13.7	28.0	42.0	15.0	1.3

Table D-4. Status of texts and reference books

School by Size	Availability of Equipment					Availability of Supplies				
	Excellent	Very Good	Good	Poor	Very Poor	Excellent	Very Good	Good	Poor	Very Poor
Large	13	39	46	12	0	14	39	53	4	0
Medium	8	27	47	21	13	4	19	64	22	6
Small	14	14	45	36	2	12	13	52	30	2
Totals	35	80	138	69	15	30	71	179	56	8
%	10.4	23.7	41.0	20.5	4.4	8.8	20.6	52.0	16.3	2.3

Table D-5. Status of equipment and supplies

Schools by Size	Special Consultants				Schools have conducted					
	Science		Math & Sci		Science Workshops		In-service Sci Courses		Science Fairs	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Large	23	81	16	79	44	49	17	56	43	48
Medium	6	108	2	106	35	75	4	88	49	53
Small	8	97	1	97	8	85	20	71	25	64
Totals	37	286	19	282	87	209	41	215	117	165
%	11.4	88.6	6.3	93.7	29.4	70.6	16.0	84.0	41.5	58.5

Table D-6. Status of programs for the improvement of science

Minutes per Week of Instruction	Schools by Size			Minutes per Week of Instruction	Schools by Size		
	Large	Medium	Small		Large	Medium	Small
5				160	2	2	1
10				165	1		1
15	1			170	1		
20		1		175	3	3	3
25		1		180	3	1	4
30	2	3	4	185			
35				190			1
40		2	1	195	-		
45				200	2	3	1
50	3	3	5	205	1		
55				210			
60	19	14	13	215	1		
65	1	1		220		1	
70	3	2		225	3	1	
75	5	5	12	230			
80	7	4	10	235			
85		1		240	2		2
90	8	18	11	245			
95		1		250	1	2	
100	10	7	11	255			
105	1	1		260			
110	2			265			
115	1			270			
120	3	15	8	275			
125	2	1	4	280			
130			1	285			1
135		1		290			
140	1			295			
145				300			
150	10	17	12	305			
155				310			
				Arithmetic Means. Minutes/ Week	125	109	107

Table D-7. Minutes per week taught in science. The quantities in the boxes indicate the numbers of teachers teaching science these many minutes per week.

Classroom Methods	Large Schools											Medium Schools											Small Schools											Ranking			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	Large	Medium	Small	Totals
Text Reading and Discussion	71	9	5	4	1	3		2	1	3	1	85	6	1	5	1	3		1	1	1		84	5	1	1	2	5	1		1	1		1	1	1	1
Teacher Demonstrations	12	31	19	11	18	5	2	1		1		12	29	22	16	15	8	1	1	1			4	37	29	9	13	3	1	1	1			2	2	2	2
Pupil Demonstrations	1	12	21	23	11	13	7	3	1				12	30	30	11	14	6	1		1			18	22	33	11	4	4	2				3	4	4	4
Pupil Experiments	2	16	24	22	16	11	4			2		2	27	26	22	14	6	7	3				3	22	28	25	15	1	2	1	1			4	3	3	3
Field Trips and Excursions	5	6	4	10	7	9	12	17	16	4	1	4	9	5	9	8	8	15	18	12	4		4	3	8	7	8	14	20	8	7	2		8	7	7	7
Outdoor Education		3	3	5	11	9	16	19	6	9			3	9	4	7	14	29	14	10	3		1	1	4	5	6	17	18	14	7	3		7	8	8	8
Directed Observations	11	15	17	8	14	15	12	1	2	1		8	13	6	10	21	20	10	8	2			7	14	9	6	11	20	7	9	3			5	5	6	5
Special Tours				2	1	2	7	19	23	18	1			3		3	2	5	10	19	27	2				1	3	4	5	15	17	19		9	9	9	9
Research Reading	3	13	10	15	10	11	10	4	7	4		2	18	18	9	18	11	8	8	8	5		5	9	8	9	19	11	5	5	5	3		6	6	5	6
Resource People				1	2	9	9	11	16	26	2				1	1	5	6	13	18	26	5					3	4	5	8	17	28		10	10	10	10

Table D-8. Numbers of teachers ranking classroom methods used. Where numbers do not occur, i.e., empty boxes, indicates that no teachers gave these particular methods a ranking.

Visual Aids	Large							Medium							Small							Ranking			
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	Rank	Rank	Rank	Rank
Films	28	21	15	14	11	9	1	10	8	9	13	17	23	13	9	3	16	19	16	13	3	2	3	6	3
Filmstrips	16	17	18	23	13	11	1	14	25	27	24	14	4	2	14	19	15	15	17	12	1	5	5	4	5
Bulletin Boards	34	27	28	9	4	1		49	37	20	1	2			6	13	28		2	1		1	1	1	1
Live Materials	18	14	18	17	19	7	7	29	11	20	23	14	6	1	20	16	27	22	9	3	1	3	2	2	2
Diorama			1	1	4	10	62			1		3	22	46			1		6	9	40	7	7	7	7
Charts	10	23	16	22	18	7	1	11	32	16	23	20	3	1	1	8	21	27	16	19	5	4	3	4	3
Models	1	4	6	14	22	36	6	3	4	4	17	20	19	10	0			12	15	11	22	11	6	5	6

Table D-9. Numbers of teachers ranking visual aids u
do not occur, i.e., empty boxes, indicate
these particular visual aids a ranking.

School Size \ Degree	no degree	B. A.	B. S.	M. A.	M. S.	PhD	Totals
Large	36	35	41	5	2	0	119
Medium	73	27	17	0	2	0	119
Small	80	22	15	1	1	0	119
Totals	189	84	73	6	5	0	357
%	52.9	23.5	20.5	1.7	1.4	0.0	

Table D-10. Numbers of teachers holding particular degrees.

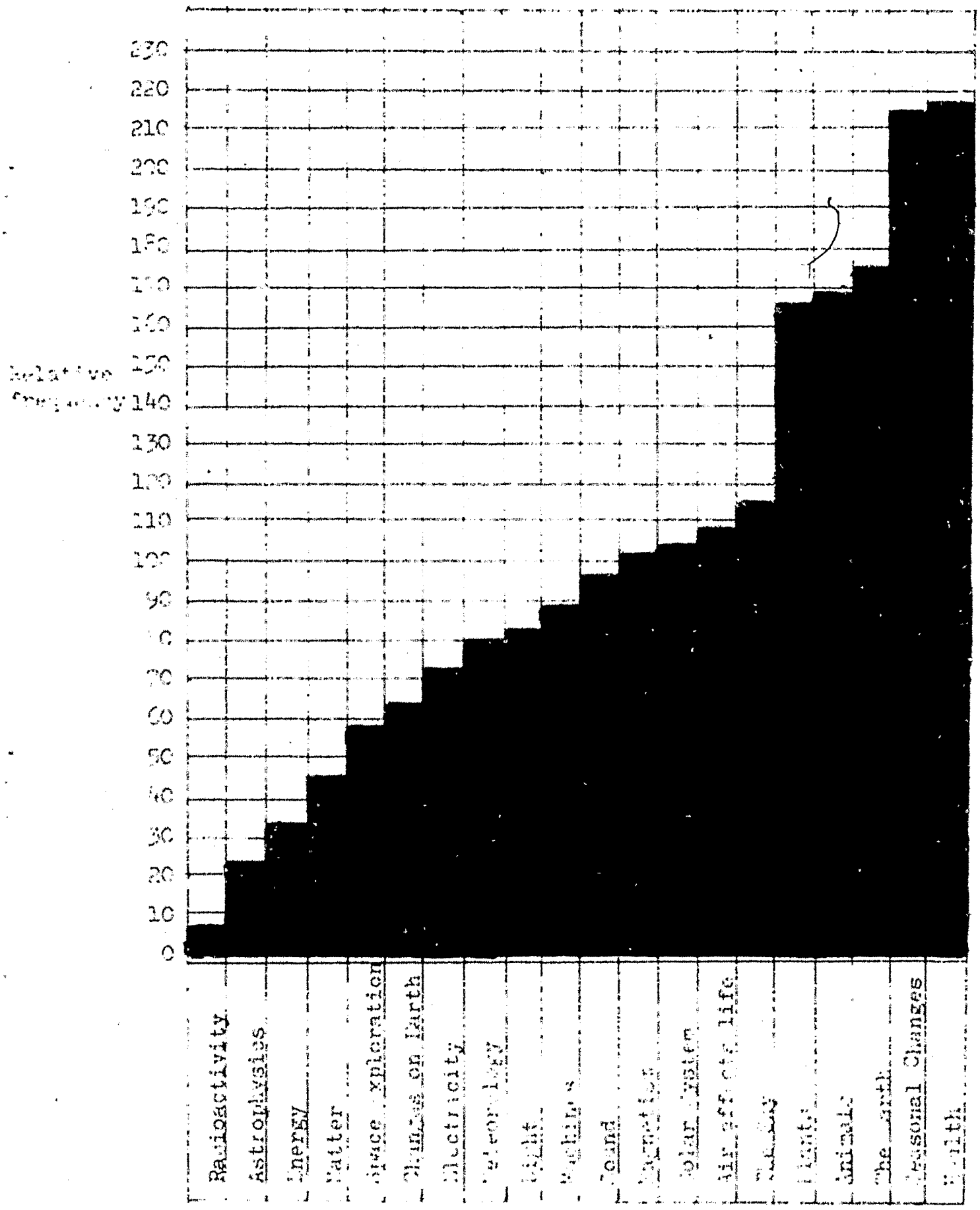
Subject Areas	Schools by Size	Semester Hours of Credit																				Totals			Arithmetic Means Hours per Teacher			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Hours		Teachers		Large	Medium	Small	Totals
Astronomy	Large	2	2	6	1		1															34	56	12	21	2.8	2.5	2.3	2.5
	Medium	1	2	2	1																	15		6					
	Small		2	1																		7		1					
Biology	Large		1	26	9	6	10		7		6				2	1						220	964	22	207	5.1	4.4	4.3	4.6
	Medium		5	33	6	11	5		8	1	1	1										306		69					
	Small		3	27	11	3	12	2	4		2											288		66					
Botany	Large		2	10	3	1			1		1		1									89	236	21	59	4.2	3.8	3.9	4.0
	Medium		7	8	2	1	3		3													93		24					
	Small		2	8	1		1		2													54		14					
Chemistry	Large	1		6	1	3	2		2		2	1		1								154	247	22	39	6.1	6.4	7.0	6.5
	Medium	1	1	2					3		2	1										64		10					
	Small		1				3		1	1			1									49		7					
Earth Science	Large		3	21	1	2	6			2							1				1	121	427	32	126	4.6	4.2	2.3	3.4
	Medium		4	29	3	2	5		1		1	1	1					1				204		48					
	Small		3	32	1		2			1			2									52		41					
Geology	Large		1	5			2			1			1									24	150	12	37	4.5	3.4	4.3	4.1
	Medium	1	2	6	2	1			1													44		13					
	Small			8			2		2													32		12					
Meteorology	Large			7																		21	27	7	9	3.0	3.0	0.0	2.0
	Medium			2																		6		2					
	Small																					0		0					
Physics	Large	1		6	3		1	1								1						59	158	13	45	4.5	2.3	3.5	3.4
	Medium		1	9		1																25		11					
	Small		3	11	4	1	1		1													74		21					
Zoology	Large			2	4	3	1		1		1		1									23	158	13	32	5.6	4.0	5.0	4.9
	Medium		1	4	2	2			1													80		18					
	Small			1	3	2	2		1													45		9					
Science Methods	Large	2	7	27	6	2	10			1												200	551	22	153	3.6	3.7	3.4	3.6
	Medium	3	7	33	2	1	11		1	2												221		60					
	Small		6	24		3	3			1	1											130		28					

Table D-11. Semester hours of credit completed by teachers in specific subject matter areas. The quantities in the boxes indicate the numbers of teachers having the given number of hours in that particular subject. Where numbers do not occur, i.e., empty boxes, indicate that no teachers have completed these numbers of hours.

School Size	Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	Averages
Large	Experience	4	4	6	6	6	6	4	4	4	5	2	4	6	3	4	3	1	2	1	3	2	1	1	3	1	2	2	3	1	3	-		2	1	1	1												13.6
	Science	3	3	3	3	4	4	2	2	1	3	1	4	2	3	3	4		1	1	1	2	1		1	1	2			1				1 1															11.0
Medium	Experience	4	1	8	3	4	12	4	3	4	3		2	8	3	8	2	7	3	3	3	2	2	3	1	1	1	3	2				2			2	1			1	2	1	1							14.4
	Science	2	1	7	1	3	4	4	2	4	2		2	3	1	3	1	4	4	2			1	1	1		1		1		1		2			1	1				1		1							13.8
Small	Experience	3	1	6	10	6	9	3	4	3	3	2	3	2	2	6	3	2	3	2	9	1	2	3	2	2	1		1	2		2	1	1	1		1			1	2							1	14.3
	Science	4	3	2	2	2	4	1	1	2	2	1	3	1		2	1				4		1	1		1			1	1											1								11.4
Totals	Experience	11	6	20	21	16	27	11	11	11	11	4	11	16	12	18	10	10	10	6	15	5	5	7	5	4	4	5	6	3	3	2	3	3	2	3	3			2	4	1	1					1	
	Science	11	7	17	8	9	12	7	5	7	9	2	11	8	4	10	6	4	5	3	5	2	3	2	2	2	3		2	2	1		2	1		1	1				2		1						

Table D-12. Total number of years of teaching experience and years of experience in teaching science. Quantities in boxes disclose the numbers of teachers having experience for the numbers of years indicated. Empty boxes indicate no teachers having these numbers of years of experience.

APPENDIX D



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